

REMARKS

Applicants appreciate the consideration of the present application afforded by the Examiner. Claim 2 has been canceled and claims 5-8 have been added through this Reply. Claims 1 and 3-8 are pending, claims 1, 3 and 4 being independent. Favorable reconsideration and allowance of the present application are respectfully requested in view of the following remarks.

Drawing Objections

The drawings are objected to for not specifying that Figure 3 is "Prior Art". Although the features of Figure 3 are discussed in the Specification as being related art, the features are not considered by Applicants to qualify as "prior art". Applicants therefore do not concede that the features of Figure 3 are statutory prior art and respectfully request that the objection to the Drawings be withdrawn.

Claim Rejections – 35 U.S.C. §103(a)

Koike et al., Yamada, and Harada:

Claims 1-3 stand rejected under 35 U.S.C. § 103(a) as allegedly being unpatentable over U.S. Patent No. 4,514,766 to Koike et al. ("Koike") in view of U.S. Patent No. 6,236,434 to Yamada ("Yamada"), and further in view of U.S. Patent No. 6,211,915 to Harada ("Harada"). Claim 2 has been canceled through this reply, rendering the rejection of claim 2 moot. As directed to the amended claims, Applicants submit the Examiner has failed to establish a *prima facie* case of obviousness and traverse the rejection.

Regarding **claim 1**, for a 35 U.S.C. §103 rejection to be proper, a *prima facie* case of obviousness must be established. *See M.P.E.P. 2142*. One requirement to establish *prima facie* case of obviousness is that the prior art references, when combined, must teach or suggest all claim limitations. *See M.P.E.P. 2142; M.P.E.P. 706.02(j)*. Thus, if the cited references fail to teach or suggest one or more elements, then the rejection is improper and must be withdrawn.

In the Office Action, the Examiner cites the Koike reference as teaching a solid-state imaging device wherein charge reading regions of photoelectric converting devices (pixels) which are adjacent to each other in the column direction are formed between the vertical transfer channels which are different from each other (see Office Action, page 3, lines 16-20). The Examiner concedes that Koike does not disclose or suggest the use of a plurality of high-sensitivity pixels and low-sensitivity pixels arranged like a tetragonal grid, wherein the high and low sensitivity pixels are arranged at an equal array pitch in positions shifted by $\frac{1}{2}$ of the array pitch from each other in both row and column directions. The Examiner further concedes that Koike fails to disclose or suggest vertical transfer channels that take a winding shape extended wholly in the column direction between the pixels, and vertical transfer electrodes that take a winding shape extended wholly in the row direction between the pixels (see Office Action, paragraph bridging pages 3-4).

In order to cure these deficiencies of the primary reference to Koike, the Examiner cites the Yamada and Harada references. Yamada is submitted by the Examiner as teaching vertical transfer channels and vertical transfer electrodes having “winding shapes” extending wholly in the column and row directions, respectively, as well as pixels elements arranged like a tetragonal grid (see Figs. 2 and 8). However, Yamada in no way teaches or suggests the use of high-

sensitivity and low-sensitivity pixels arranged in a tetragonal grid. Harada is submitted by the Examiner as teaching the use of high-sensitivity and low-sensitivity pixels (see Fig. 7, col. 2, lines 13-19). However, Harada in no way teaches or suggests that said high-sensitivity and low-sensitivity pixels are arranged like a tetragonal grid. Furthermore, Harada and Yamada offer no suggestion or motivation, nor would one of ordinary skill in the art find it obvious, to modify the pixels of Koike's solid-state imaging device with the alternating charge reading region structure including high-sensitivity and low-sensitivity pixels arranged in a $\frac{1}{2}$ pitch shifted tetragonal grid arrangement.

It is respectfully submitted that the three cited prior art references taken either alone or in combination are not capable of solving the problem solved by the Applicant's claimed invention or include all the features of independent claim 1 as demonstrated above. More specifically, the Applicant's claimed invention avoids the need for post-processing in order to separate the signals from low-sensitivity pixels and high-sensitivity pixels (e.g., when desiring to output a signal from only one of the high- and low-sensitivity pixels arrays). In the prior art, charges from the high- and low-sensitivity pixels are transferred to the horizontal register in alternating fashion (please see page 5, lines 11-21 of the instant application). In order to solve such a problem, the claimed invention recites that the high-sensitivity and low-sensitivity pixels be arranged like tetragonal grids in the row direction and the column direction orthogonal thereto and that *charge reading regions of high-sensitivity or low-sensitivity pixels which are adjacent to each other in the column direction be formed between the vertical transfer channels which are different from each other*, as illustrated in Fig. 1. This enables the transfer to the horizontal register of two rows of high-sensitivity pixels charges or two rows of low-sensitivity pixel charges at the same

time. Moreover, it is respectfully submitted that only a person skilled in the art who had access to the present application would be motivated to combine the teachings of the three cited prior art references in order to solve the unrecognized problem disclosed in Applicant's specification. In other words, the only motivation to combine the three cited references in the way suggested in the Office Action is gleaned from the hindsight provided by Applicant's specification.

Another requirement to establish prima facie case of obviousness is that there must be a suggestion or motivation within the cited reference(s) to modify the reference(s) as proposed in the Office Action. *See M.P.E.P. 2143.01*. The claimed invention as a whole must be considered. It is not enough to determine whether the differences themselves would have been obvious, but whether the claimed invention as a whole would have been obvious. *See M.P.E.P. 2141.02*.

In the Koike reference, referring to Fig. 6, the pixel elements (1) are arranged such that the charge reading regions are formed to readout charges from the pixels into vertical transfer channels (2-1, 2-2) which are directly adjacent to each other. With this arrangement, two rows of pixel charges are capable of being read out from the vertical transfer channels to the horizontal transfer register at the same time. Koike does not disclose high-sensitivity and low-sensitivity pixels arranged in a tetragonal grid as previously discussed, *supra*. Even if one of ordinary skill in the art were motivated to replace the pixels of Koike with high- and low-sensitivity pixels and arrange the pixels in a tetragonal grid, which Applicants do not concede, the resultant device would not be capable of reading out two rows of high-sensitivity pixels charges or two rows of low-sensitivity pixel charges at the same time. At best, the resultant combination would only be capable of reading out one row of high-sensitivity pixels charges or one row of low-sensitivity pixel charges at the same time. Thus, combining the references in this manner would not arrive

at the present invention. Furthermore, one of ordinary skill in the art would not be motivated to combine the references in order to solve a problem that is not recognized by the prior art.

The Applicants respectfully submit that the Office Action is based upon a selective combination of features found in the three references, and that such selective combining is impermissible. As stated in *Interconnect Planning Corp. v. Feil*, 774 F.2d 1132, 1143 (Fed. Cir. 1985), "When prior art references require selective combination by the court to render obvious a subsequent invention, there must be some reason for the combination other than the hindsight gleaned from the invention itself." It is respectfully submitted that the Office Action cites the Koike patent, and then utilizes the present application as a road map to selectively replace various features of the Koike reference.

Therefore, Applicants submit that claim 1 and any claim depending therefrom are patentable over any combination of Koike, Yamada, and Harada and respectfully request that the rejection of claims 1-3 under §103(a) be withdrawn.

Even if Koike, Yamada, and Harada could possibly be combined in the manner described by the Examiner, which Applicants do not concede, the Examiner has not provided a *prima facie* case of obviousness for claim 1 in view of the current amendment.

As amended, claim 1 recites the feature wherein "four vertical transfer electrodes are provided corresponding to one of the photoelectric converting devices adjacent to each other in the column direction, other four vertical transfer electrodes are provided corresponding to the other of the photoelectric converting devices adjacent to each other in the column direction, and the vertical transfer electrodes are driven by vertical transfer pulses having eight phases."

Applicants respectfully submit that Koike, Yamada, and Harada fail to disclose at least these features, alone or in combination.

In the Office Action, the Examiner rejected the aforementioned features as being unpatentable in view of Official Notice (with respect to previously presented claim 2, now incorporated into independent claim 1). Applicants note that Official Notice may be taken of facts outside of the record which are capable of instant and unquestionable demonstration as being “well-known” in the art. *See M.P.E.P. 2144.03*. Thus, if the assertion is traversed, references must be cited in support of the position taken in the Official Notice. *See M.P.E.P. 2144.03*.

In this instance, Applicants traverse the Examiner’s assertion of Official Notice. Since Koike discloses a device provided with clock pulse generators 5-1 and 5-2 (see Figs. 1 and 2), Koike at most teaches that the vertical transfer electrodes are driven by pulses having two phases. Also, Harada and Yamada are silent as to how many vertical transfer pulses are used to drive their respective electrodes. Accordingly, none of the references teach or suggest the features of claim 1. Absent some teaching to the contrary, Applicants submit that one of ordinary skill in the art would not necessarily find it “well-known” to provide four vertical transfer electrodes corresponding to one of the photoelectric converting devices adjacent to each other in the column direction, provide other four vertical transfer electrodes corresponding to the other of the photoelectric converting devices adjacent to each other in the column direction, and drive the vertical transfer electrodes by vertical transfer pulses having eight phases.

Regarding **claim 3**, likewise as with respect to claim 1 above, Applicants submit that, alone or in combination, Koike, Yamada, and Harada fail to disclose at least the features wherein

“two vertical transfer electrodes are provided corresponding to one of the photoelectric converting devices adjacent to each other in the column direction, other two vertical transfer electrodes are provided corresponding to the other of the photoelectric converting devices adjacent to each other in the column direction, and the vertical transfer electrodes are driven by vertical transfer pulses having four phases.” As with respect to claim 1 above, Koike discloses a device provided with clock pulse generators 5-1 and 5-2 and at most teaches that the vertical transfer electrodes are driven by pulses having two phases. Harada and Yamada are silent as to how many vertical transfer pulses are used to drive their respective electrodes. Applicants traverse the Examiner’s assertion of Official Notice and submit that, absent some teaching to the contrary, one of ordinary skill in the art would not necessarily find it “well-known” to provide two vertical transfer electrodes corresponding to one of the photoelectric converting devices adjacent to each other in the column direction, provide other two vertical transfer electrodes corresponding to the other of the photoelectric converting devices adjacent to each other in the column direction, and drive the vertical transfer electrodes by vertical transfer pulses having four phases.

Accordingly, Applicants submit that independent claims 1 and 3 are patentable over any combination of Koike, Yamada, and Harada and respectfully request that the rejection of claims 1 and 3 under §103(a) be withdrawn.

Sekine et al., Yamada, and Harada:

Claim 4 stands rejected under 35 U.S.C. § 103(a) as allegedly being unpatentable over U.S. Patent No. 4,336,556 to Sekine et al. (“Sekine”) in view of Yamada and further in view of

Harada. Applicants submit the Examiner has failed to establish a *prima facie* case of obviousness and traverse the rejection.

Regarding **claim 4**, for a 35 U.S.C. §103 rejection to be proper, a *prima facie* case of obviousness must be established. *See M.P.E.P. 2142*. One requirement to establish *prima facie* case of obviousness is that the prior art references, when combined, must teach or suggest all claim limitations. *See M.P.E.P. 2142; M.P.E.P. 706.02(j)*. Thus, if the cited references fail to teach or suggest one or more elements, then the rejection is improper and must be withdrawn.

In the Office Action, the Examiner cites the Sekine reference as teaching a solid-state imaging device wherein respective vertical transfer channels are shared for transfer of the charges from two adjacent columns of photoelectric converting devices (pixels) (see Office Action, page 9, lines 1-2). The Examiner concedes that Sekine does not disclose or suggest the use of a plurality of high-sensitivity pixels and low-sensitivity pixels arranged like a tetragonal grid, wherein the high and low sensitivity pixels are arranged at an equal array pitch in positions shifted by $\frac{1}{2}$ of the array pitch from each other in both row and column directions.

In order to cure these deficiencies of the primary reference to Sekine, the Examiner cites the Yamada and Harada references in the same capacity as discussed with respect to claim 1, *supra*. Yamada is submitted by the Examiner as teaching vertical transfer channels and vertical transfer electrodes having winding shapes extending wholly in the column and row directions, respectively, as well as pixels elements arranged like a tetragonal grid (see Figs. 2 and 8). However, Yamada in no way teaches or suggests the use of high-sensitivity and low-sensitivity pixels arranged in a tetragonal grid. Harada is submitted by the Examiner as teaching the use of high-sensitivity and low-sensitivity pixels (see Fig. 7, col. 2, lines 13-19). However, Harada in

no way teaches or suggests that said high-sensitivity and low-sensitivity pixels are arranged like a tetragonal grid. Furthermore, Harada and Yamada offer no suggestion or motivation, nor would one of ordinary skill in the art find it obvious, to modify the pixels of Sekine's solid-state imaging device wherein respective vertical transfer channels are shared for transfer of the charges from two adjacent columns of pixels, such that said pixels are high- and low-sensitivity pixels arranged in a $\frac{1}{2}$ pitch shifted tetragonal grid arrangement.

It is respectfully submitted that the three cited prior art references taken either alone or in combination are not capable of solving the problem solved by the Applicant's claimed invention or include all the features of independent claim 1 as demonstrated above. More specifically, the Applicant's claimed invention avoids the need for post-processing in order to separate the signals from low-sensitivity pixels and high-sensitivity pixels (e.g., when desiring to output a signal from only one of the high- and low-sensitivity pixels arrays). In the prior art, charges from the high- and low-sensitivity pixels are transferred to the horizontal register in alternating fashion (please see page 5, lines 11-21 of the instant application). In order to solve such a problem, the claimed invention recites that the high-sensitivity and low-sensitivity pixels be arranged like tetragonal grids in the row direction and the column direction orthogonal thereto and that *the respective vertical transfer channels are shared for the transfer of the charges from the high-sensitivity photoelectric converting devices for one column and the transfer of the charges from the low-sensitivity photoelectric converting devices for one column which is adjacent thereto*, as illustrated in Fig. 1. This enables the transfer to the horizontal register of two rows of high-sensitivity pixels charges or two rows of low-sensitivity pixel charges at the same time. Moreover, it is respectfully submitted that only a person skilled in the art who had access to the

present application would be motivated to combine the teachings of the three cited prior art references in order to solve the unrecognized problem disclosed in Applicant's specification. In other words, the only motivation to combine the three cited references in the way suggested in the Office Action is gleaned from the hindsight provided by Applicant's specification.

Another requirement to establish prima facie case of obviousness is that there must be a suggestion or motivation within the cited reference(s) to modify the reference(s) as proposed in the Office Action. *See M.P.E.P. 2143.01*. The claimed invention as a whole must be considered. It is not enough to determine whether the differences themselves would have been obvious, but whether the claimed invention as a whole would have been obvious. *See M.P.E.P. 2141.02*.

In the Sekine reference, referring to Fig. 10, the pixel elements (23) are arranged such that the charge reading regions are formed to readout charges from the pixels into vertical transfer channels (21). Sekine does not disclose high-sensitivity and low-sensitivity pixels arranged in a tetragonal grid as previously discussed, *supra*. Even if one of ordinary skill in the art were motivated to replace the pixels of Sekine with high- and low-sensitivity pixels and arrange the pixels in a tetragonal grid, which Applicants do not concede, the resultant device would not be capable of reading out two rows of high-sensitivity pixels charges or two rows of low-sensitivity pixel charges at the same time. At best, the resultant combination would only be capable of reading out one row of high-sensitivity pixels charges or one row of low-sensitivity pixel charges at the same time. Thus, combining the references in this manner would not arrive at the present invention. Furthermore, one of ordinary skill in the art would not be motivated to combine the references in order to solve a problem that is not recognized by the prior art.

The Applicants respectfully submit that the Office Action is based upon a selective combination of features found in the three references, and that such selective combining is impermissible. As stated in *Interconnect Planning Corp. v. Feil*, 774 F.2d 1132, 1143 (Fed. Cir. 1985), "When prior art references require selective combination by the court to render obvious a subsequent invention, there must be some reason for the combination other than the hindsight gleaned from the invention itself." It is respectfully submitted that the Office Action cites the Sekine patent, and then utilizes the present application as a road map to selectively replace various features of the Sekine reference.

Therefore, Applicants submit that claim 4 and any claim depending therefrom are patentable over any combination of Sekine, Yamada, and Harada and respectfully request that the rejection of claim 4 under §103(a) be withdrawn.

Even if Sekine, Yamada, and Harada could possibly be combined in the manner described by the Examiner, which Applicants do not concede, the Examiner has not provided a *prima facie* case of obviousness for claim 4 in view of the current amendment.

As amended, claim 4 recites at least the features wherein "two vertical transfer electrodes are provided corresponding to one of the photoelectric converting devices adjacent to each other in the column direction, other two vertical transfer electrodes are provided corresponding to the other of the photoelectric converting devices adjacent to each other in the column direction, and the vertical transfer electrodes are driven by vertical transfer pulses having four phases."

Sekine is expressly directed to a device based on two-phase driving (see col. 2, lines 42-52; Figs. 8, 10, 11, and 13) and at most teaches that the vertical transfer electrodes are driven by pulses having two phases. Harada and Yamada are silent as to how many vertical transfer pulses

are used to drive their respective electrodes. Applicants traverse the Examiner's assertion of Official Notice and submit that, absent some teaching to the contrary, one of ordinary skill in the art would not necessarily find it "well-known" to provide two vertical transfer electrodes corresponding to one of the photoelectric converting devices adjacent to each other in the column direction, provide other two vertical transfer electrodes corresponding to the other of the photoelectric converting devices adjacent to each other in the column direction, and drive the vertical transfer electrodes by vertical transfer pulses having four phases.

Therefore, Applicants submit that claim 4 is patentable over any combination of Sekine, Yamada, and Harada and respectfully request that the rejection of claim 4 under §103(a) be withdrawn.

New Claims

New claims 5-8 have been introduced through this amendment. At least for the reasons present above with respect to claims 1 and 4, Applicants submit that claims 5-8 are in condition for allowance. No new matter has been entered.

CONCLUSION

All objections and rejections raised in the Office Action having been addressed, it is respectfully submitted that the present application is in condition for allowance. Notice of same is earnestly solicited.

Should there be any outstanding matters that need to be resolved in the present application, the Examiner is respectfully requested to contact John R. Sanders, Registration No.

Application No. 10/620,459
Amendment dated: May 16, 2007
Reply to Office Action dated January 16, 2007

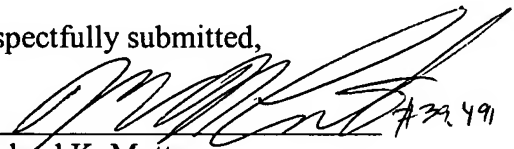
Docket No.: 0649-0902P

60,166, at (703) 205-8016, to conduct an interview in an effort to expedite prosecution in connection with the present application.

If necessary, the Commissioner is hereby authorized in this, concurrent, and future replies to charge payment or credit any overpayment to Deposit Account No. 02-2448 for any additional fees required under 37.C.F.R. §§1.16 or 1.14; particularly, extension of time fees.

Due Date: May 16, 2007

Respectfully submitted,

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